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Inaugural Essay,
on the
Nature and Properties
of the
Blood.

For the Degree of Doctor of Medicine,
in the
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By
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of
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In writing an Inaugural dissertation, it is not to be presumed, that a student, closely confined to the common routine of Study, can adduce any thing very new or striking: - The judicious selection, and harmonious arrangement of facts, is all that can be reasonably expected from his inexperienced Pen.

Should the following Essay, evince a want of novelty, or interest, the cause will not I trust, be imputed to want of Industry,

the following are the
names of the persons who
were present at the
meeting of the
committee on the
10th of May 1861.
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but, rather to the nature of the subject. -

- In making the Blood the subject of the present Essay. I have been influenced more by the novelty of the subject, than by any idea of my own competency to do it justice: - So well and ably has it been treated of, by the ever memorable, and justly celebrated Hunter, that, it might appear to some, presumptuous in me, to enter upon a field so much exhausted: - But, I rest satisfied, well assured, that the indulgence of the Faculty will be granted. -

Few of the Laws of the animal Economy, are more intricate, than those that relate to the blood: - It is, indeed, easy

and as to the nature of the work
the subject of the present work
I have been informed that it
the result of the original work
of any kind of any other work
may be in the future. It will not
only be in the future of the
the same result and only
distinct. There is no
first to some extent
it is a work upon a part
a work upon a part
nothing but a work upon a part
indication of the thing and
a part.

That of the thing of
the same thing, or more
interest than that which
to the thing. It is a work upon

to state the appearances which it usually presents. But, with the origin of the changes which it undergoes, and the causes of its different phenomena, we are but little informed. And the erroneous speculations, and unfounded theories, which have been adduced for the purpose of removing the veil of nature, have tended only to retard the progress of inquiry, and to add, "Darkness to obscurity."

There is another point however, which should receive some attention:— It is this, viz: that, although ~~should~~ the blood should receive due attention from all, yet, neither, the Anatomist, The Physiologist, The Chemist,

or, The Practitioner, claim it, as coming
under their own immediate province;
It has consequently been very much neg-
lected; - The Chemist, it is true, has paid con-
siderable attention to its proximate and
constituent principles: - The Physiologist,
to its vital Phenomena: - And the Prac-
titioner, to its Morbid Appearances, &c,
But it may, I think, with some degree
of truth, be said, that each one, has
attended more particularly to his
own view of the subject, to the Detri-
ment of all others. That It might be
my happy lot, to improve these things,
is my sincere desire, - but more cannot
be expected, from a pen so inexperien-
ced as mine, - than a feeble attempt
to arrange and harmonize the facts
which have been so abundantly
advanced by a great number of con-

tributors. —

The Blood. —

The Blood is a peculiar fluid, circulating throughout the vessels of all classes of animal beings; it penetrates into almost every recess of the Body, distributing itself through the numerous capillaries of its different vessels, of forming Nourishment and vitality. —

The importance of this fluid is very considerable; it distends the cavities of the heart and bloodvessels, and prevents them from collapsing; it also stimulates them to contraction, by which means, the circulation is performed. it is supposed to generate within itself animal-Heat, which it propagates throughout the Body:



it nourishes the whole Body, and also,
is that source, from which, every secre-
tion of the Body is derived.

Blood when first drawn
from the vessels is in adhesive state of a
homogeneous consistence, and in the
human subject of the temperature
of about 97° Fahren - very soon after be-
ing drawn, it suffers to remain at rest,
it coagulates, and during that process
separates into two distinct parts, so that
at last, it appears, a red mass, floating
in a yellowish fluid; this red mass, is
called the Crassamentum, and the
yellow fluid the Serum. The Crassa-
mentum usually floats in the Serum,
but instances have been recorded by Le
Huen, Hunter, and by Fov, of the Crassa-
mentum enveloping the Serum. There
is also, another part, which will not coag-



iate except by Extract of Lenses, an which is denominated "Lenses".

The Halitus.

After Blood has been fresh drawn, and previous to its cooling, there is a steam or vapour continually flying off, which is found to consist of Carbon and Hydrogen. Thackerat, says it differs very little from common water. Plenk, seems to have paid most attention to it; he calls it, "gas animale sanguinis", and says that it produces many very important effects in the animal economy. It has a putrid smell, between urine and sweat.

Of the Coagulation of the Blood.

The first change which the blood undergoes after being drawn from the vessels is its Coagulation, the period for the completion of which pro-



case, is averaged at about 5 minutes. Thackeray says it is fully completed, in from 3 to 8 minutes after being drawn, tho' in some instances it is a much shorter period, in coagulating. The first stage, towards coagulation, is a species of decomposition, which causes a separation of the Serum: The Serum, constituting a part of the whole mass, in the fluid state: But, it is not exactly known, whether the Serum, while the blood is circulating, be a distinct part of the blood, as we have no means of separating it, from the Crassamentum: The cause of the coagulation of the blood, has never been thoroly explained, it is a circumstance which does not exactly resemble any other with which we are acquainted, and the operation of external agents upon it, is not so well understood.



were unable, to refer it; to any general operation of the Physical properties of matter. It was supposed that Coagulation depended upon the action of the air, but this is not correct, for it will coagulate "in vacuo". It was also thought to depend upon the abstraction of heat; but Heat has been found to hasten the Coagulation, after the Crassamentum has been exposed to the air, for some hours, its exterior imbibes oxygen, and assumes a florid Hue; this change resembling that produced in the Lungs by respiration. It has also been observed, that if the Crassamentum, be not kept moist, in the Serum, instead of becoming scarlet the colour becomes a dark brown. In many kinds of death we find, the blood does not coagulate: In some cases the muscles will con-



fract, and the blood will remain fluid,
in some cases, the contrary will take
place while, in others, the blood will
coagulate only to the consistence of
cream. Blows on the stomach, kill
immediately, since the muscles do
not contract, neither does the blood
coagulate: Death, caused by sudden
fits of passion is of this nature, -
and in most of these cases the body
very soon after death, becomes putrid.

In many diseases, if accurately
attended to, there is no doubt, but
that we should find this correspon-
dence between the muscles, and the
blood; for, just as Hunter observes, when
there is strong action going on, the
muscles contract strongly after death,
and the blood also coagulates strong-
ly. The quantity of blood, contained in the



body, has never yet been exactly ascertained; Sir Astley Cooper, supposes it to be about $\frac{1}{14}$ of the weight of the body:

Having procured a dog, weighing 4 $\frac{1}{2}$ lbs he opened the Internal Jugular vein, from whence he obtained $\frac{3}{4}$ of blood, he afterwards opened the common Carotid artery and obtained $\frac{3}{4}$ more; the dog then died, and Sir Astley supposes that there remained in the Heart, about $\frac{3}{4}$ more of coagulated blood..

— of the Crassamentum. —

The Crassamentum may be separated by ablutum into 2 parts; The Fibrine, and the red Particles or Crust

— of the Fibrine. — If fresh drawn blood, be stirred with a stick, for a few minutes, an adhesion of a substance, to the rough surface of the stick takes place, and this flaky substance, by



repeated washing, distinctly shows the
Fibrine which forms its basis. It con-
sists of ligate Carbon and Hydrops;
the former of which prevails most;
It appears also from Hatchett, that
there exist some traces of albumen.
Fibrine is with difficulty soluble either
in Sulphuric acid, Alcohol or in solu-
tions of Ammonia, and is scarcely
at all affected by any other chemi-
cal agent.

— Of the Red Particles or Eror. —

They have been supposed
to be circular: Mr. Huxson, describes
them as consisting, of a solid cen-
tre, surrounded by a vesicle filled with a flu-
id, he also says, that by adding water
to them, they swell out, and become
larger; he afterwards says, they are
soluble in, and impart their colour to water.



When they are put into water, they dissolve,
which destroys their globular form; it is therefore
the Serum, and probably the coagulating
lymph also, which circulating, which con-
fines them to this globular form; but if
we dilute the Serum with water they
dissolve in it, and this appears to take
place in a moment; also, if urine be
diluted with water, they dissolve in it.
They are also soluble in vinegar; but if
the vinegar be diluted with water,
they will dissolve sooner in it, than in
either vinegar or water alone. Lemon juice
dissolves them. They are said to be of
the same size in the mouse as in
the ox, - larger in birds, and still
larger in the Skate-Fish. Baker,* speak-
ing of the water-sow, states that the "glo-
bules appear about ten times as large"
"as those of the Human blood, and

*Employment for the Microscope.



their progression motion is very slow, and tan-
-gine, whereby, they become more distin-
-guishable than the globules are, in the
blood of animals whose circulations
"simplex"? - Nitre, considerably augments
their colour so as to convert it, to a bright
red, while on the contrary there are some
substances, by which, their colour is des-
trayed without altering their form.
If we dilute a Muretic Acid, so as to be
more pungent and three times stronger
than common vinegar, it does not dis-
-solve them, but merely destroys their
colour; but, by adding more water
to them, they are dissolved. The Sulfuric
oils, will also destroy their colour.
They do not circulate all over the
body: (for example, they do not circu-
late in the conjunctiva.)



Of The Serum.

The specific gravity of the Serum, has usually been stated at 1020 to 1030. - Bostrick considers it to be 1023: - and Marcet 1029. The Serum, is that fluid part of the blood of a yellowish colour, rather inclining to green; It is heavier than water, and has the property of turning blue vegetable colours green. Coagulation is not necessary to separate the Serum, from the blood, for we find it separated in disease, as in Dropsy. In Dropsy the Serum constitutes about $\frac{3}{4}$ of the whole mass of the blood. It varies in quantity, in different persons; in the robust, it is small in proportion as $\frac{1}{3}$; in thin and emaciated people, it is much larger. The Sulphure and other mineral acids readily coagulate Serum; and its albumen is precipitated in the form of a



flaky mass. It will coagulate on exposure to heat of 150° or 160° Fahrenheit. -

The use of the Serum, is probably, to keep suspended and undissolved the red globules, for it is found in larger quantity, where these red globules are most abundant. It is perhaps also intended, to suspend and keep dissolved, any foreign substances in the blood, whether of use to the body or otherwise, by acting on them as a solvent. Thus, we see, in a person afflicted with jaundice, the Serum is yellower than common, also when a person has taken Rhubarb, we may perceive the same effect. Mr Hunter, supposes it to be the solvent of all our secretions.

of the ^{serum} Serosity.

The existence of the 'Serosity,' as a substance distinct from the albumen,



more, seems first to have been noticed by
Butt, in a Thesis published at Edinburgh,
in 1760. Its properties were still further
developed by Cullen, in his "Institutions";
It became the subject of more nu-
meral chemical analysis in France, by Par-
mentier and Bergeux: The most im-
portant point, which the French chem-
ists state as the result of their experi-
ments, is the discovery of a quantity of
Gelatine, contained in the Forosely, uni-
ted with a variety of other salts, from
which no mode, as at present known,
of separating it, without its being de-
composed. Dr. Marcet, gives it the
name of "Muco-extractive matter."

— of The Chemical Qualities, —
— of The Blood. —

Bergeux states, that the
blood of the ox, differs in no respect, from



that of the human subject, except, in containing more azote, and a less proportion of the Saline matter. The latter, however is a circumstance curious and unexpected, when we consider, that man, lives in a great measure, on animal food; while the ox sustains life, wholly ^{ly} ~~on~~ vegetable aliment.

The blood, of some creatures, is found, while circulating, to contain air bubbles; they are found, in the lance, and sea-tortoise, - in the Hedge-Hog, - in fish - and in the viper.

In a former part of this essay, it was mentioned, that the blood was of the temperature of 97° Fark^t; - its temperature has been known to be materially altered. In Febrile cases, the heat of the blood, as well as of the body, is sometimes, augmented several

degrees, while, on the contrary, in some affec-
tions, the blood, as it flowed from the
veins has produced, a marked sen-
-sation of cold; Morgagni has re-
-lated several instances, in one of which,
the Patient, compared the feeling pro-
-duced by the stream on her arm, to that
of Ice. In most of these Cases, there
existed some nervous affection; -

Thackrah also relates an instance
of a woman; (Pregnant) he says, that
on Bleeding her, the Stream produced
a chilly feel, both on his finger and
on the Patient's arm; he says the case
was not attended with any remarka-
-ble symptoms, - the Patient suffering
only from the ailments common
to her condition.

